

PRELIMINARY AMENDMENT
Divisional of U.S. Appln. No. 09/582,868 (Q78179)

AMENDMENTS TO THE SPECIFICATION

Amend the specification by inserting before the first line the following new paragraph:

This is a divisional of Application No. 09/582,868 filed January 25, 2001, which is a 35 U.S.C. § 371 of International Application No. PCT/JP99/06135 filed November 4, 1999; the disclosures of which are incorporated herein by reference.

On page 19, please replace the eighth full paragraph with the following new paragraph:

~~Fig. 28 is a~~ Figs. 28(a) through (f) are front ~~view~~ views illustrating the production steps.

On page 28, please replace the second full paragraph with the following new paragraph.

Subsequently, a fixing tape made of a polypropylene which is not shown (adhesive coated on one surface thereof) was stuck to the wall portion of the electricity-generated element 30-21 parallel to the winding axis 22 at the insulating portion of the electrode plate to a length corresponding to the width of the electrode (length of the electricity-generating element 30-21 parallel to the winding axis of the electricity-generating element) to fix the winding of the electricity-generating element 30-21.

Please replace the paragraph bridging page 28 to 29 with the following new paragraph:

The electricity-generating element thus formed was then received in a cylindrical battery case 20 formed by a metal-laminated resin film which is open in two directions in such an arrangement that the winding axis 22 of the electricity-generating element 30-21 was

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perpendicular to the plane of the opening. The two opposing edges of the opening where the lead terminals 23 and 24 were disposed were welded to each other with the lead terminals 23 and 24 put therein to seal the battery case. Subsequently, an electrolytic solution was vacuum-injected into the battery case through the other opening in an amount such that the various electrodes and the separator can be thoroughly wet and there can be present no free electrolytic solution outside the electricity-generating element. Thereafter, the two opposing edges of the other opening were welded to each other to seal the battery case 20.

On page 47, please replace the first full paragraph with the following new paragraph:

As a result, the battery 4A showed a discharge capacity of 490 mAh average over 10 samples at the 100th cycle while the battery R10 showed a discharge capacity of 465 mAh averaged over 10 samples at the 100th cycle, demonstrating that the battery 4A of the present embodiment showed a less capacity decrease with the number of cycles. This is presumably because the welded portion 37 (= welded portion X) is fixed to the surface of the battery case 31, making the case thicker at the area where the welded portion 37 is fixed. In such an arrangement, the electricity-generating element 521-30 is kept pressed at the center thereof, keeping the distance between the electrodes constant during charge-discharge cycle and hence making it possible to minimize the capacity drop with the number of cycles. Further, when a plurality of the nonaqueous secondary electrolytic batteries of the present embodiment are stacked in series with or in parallel with each other, the welded portion 37 of the battery case 31 gives no obstruction, thereby providing a high energy density battery without any unnecessary space. Thus, the nonaqueous secondary electrolytic battery of the present embodiment is favorable for stacking.

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Please replace the paragraph bridging page 63 to 64 with the following new paragraph:

As the active positive electrode material there was used a lithium-cobalt composite oxide. A positive electrode plate 82 comprises the foregoing lithium-cobalt composite oxide retained as an active material layer 84 on both surfaces of a collector 83. The collector 83 is an aluminum foil having a thickness of 20 μm . The positive electrode plate 82 was prepared by a process which comprises mixing 8 parts of a polyvinylidene fluoride as a binder and 5 parts of acetylene black as an electrically-conducting agent with 87 parts of the active material, properly adding N-methylpyrrolidone to the mixture, pasting the mixture to prepare a positive electrode compound, applying the positive electrode compound to both surfaces of the collector 83, and then drying the coated material. In this case, the collector 83 has an exposed area free of positive electrode compound formed at the end thereof. The positive electrode plate 82 has a thickness of 180 μm and a width W of 49 mm. A positive electrode lead terminal 86 was welded to the exposed area of the collector. An adhesive insulating polyimide tape 87 was then stuck to the positive electrode plate 82 at a position remote from the lead terminal 86. The insulating tape 87 has a width $W - W_1$ of 55 mm and a length of 25 mm. The width W_2 over which an adhesive 88 is applied is 35 mm. The adhesive is not present on a 10 mm margin at the two longitudinal ends of the insulating tape. Accordingly, there is given a relationship $W_2 < W < W_1$ as shown in Fig. 23.

On page 66, please replace the second full paragraph with the following new paragraph:

Subsequently, for comparison, a comparative battery R16 comprising the insulating tape 87 used in the preparation of the battery 11A having an adhesive applied to the entire

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surface thereof ($W-W_1=W_2$) and a comparative battery R17 having the same structure as R16 except that the width of the insulating tape having an adhesive applied to the entire surface thereof is the same as the width of the electrodes ($W_2=W=W_1$) were prepared.

Please replace the paragraph bridging page 70 to 71 with the following new paragraph:

A foam-preventive material 110 is provided on the end of the electricity-generating element 107 opposite the lead drawing portion. The foam-preventive material 110 is an unwoven cloth of long fiber made of polypropylene (produced by ASAHI CHEMICAL INDUSTRY CO., LTD.) and has a thickness of 0.23 mm, a tear strength of 0.40 kg both in the longitudinal and crosswise directions and a weight of 22 g/m². The foam-preventive material 110 is fixed to the end of the electricity-generating element 107 opposite the lead terminal 3-104 with an adhesive so as to cover entirely the end. The foam-preventive material 110 may be merely brought into the end of the electricity-generating element 107. However, when the foam-preventive material 110 is fixed to the electricity-generating element 107 with an adhesive in this battery, the electrolytic solution can be prevented from leaking out of the battery case even if the battery case 100 has not been completely sealed. In this battery, the lead terminal 104 and the foam-preventive material 110 are provided on the opposite sides across the electricity-generating element 107. However, the two parts may be provided on the same side.

Please replace the paragraph bridging pages 71 to 72 with the following new paragraph:

Firstly, the electricity-generating element 107 was fixed in such an arrangement that the lead terminal 3-104 facing downward (step a). The foam-preventive material 110 was

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disposed covering entirely the other end of the electricity-generating element 107, and then fixed thereto with an adhesive. Subsequently, these parts were wrapped by a laminated resin sheet constituting the battery case 100 in such an arrangement that only the lead terminal 104 was exposed. The edge of the resin sheet was then heat-fused to seal the opening (step c). However, the battery case 100 had an opening 111 left on the foam-preventive material 110 side thereof. Subsequently, the electrolytic solution was injected onto the foam-preventive material 110 through the opening 111 (step d). Then, the electrolytic solution was absorbed by the foam-preventive material 110, and then penetrates into the separator disposed between the positive electrode plate and the negative electrode plate. Then, the air was removed from the interior of the battery case 2-100 by a vacuum-pump (step e). Finally, the opening 111 was heat-fused to seal the battery case. Thus, a battery 1 having a designed capacity of 500 mAh was obtained (step f).